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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,280	02/12/2004	Eric Schwartz	248789US41	3523

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EXAMINER
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VERDIER, CHRISTOPHER M

ART UNIT	PAPER NUMBER
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3745

DATE MAILED: 07/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/776,280

Applicant(s)

SCHWARTZ ET AL.

Examiner

Christopher Verdier

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8-14 and 18-20 is/are allowed.
- 6) ☒ Claim(s) 1-3,7 and 15-17 is/are rejected.
- 7) ☒ Claim(s) 4-6 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 May 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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Applicants' Amendment dated May 4, 2005 has been carefully considered but is non-persuasive. Claims 1-20 are pending, with claims 8-20 being newly added. Figures 5-6 have been amended to overcome the drawing objections set forth in the previous Office action. The new abstract overcomes the objection set forth in the previous Office action. Claim 1 has been amended to overcome the rejection under 35 USC 112, second paragraph set forth in the previous Office action. Correction of the above matters is noted with appreciation.

With regard to the rejection of claims 1-2 and 7 under 35 USC 103(a) as being unpatentable over Fukuno 6,089,822 in view of North 5,609,466, Applicants have argued that the above references, neither individually nor in combination, support a prima facie case of obviousness, and that passages 92 of Fukuno are discharge passages for cooling air supplied from the trailing edge passage 44 into the cavity 45 that is then injected through small holes 101 of the impingement plates 83, 84 for cooling a central portion of the inner shroud 126, and that passages 92 do not generate a head loss in the asserted leakage zone near element 73 so as to reduce a flow rate of cooling air passing through the zone. Applicants have further argued that given the small clearance between the end of the cylindrical member 47 and the inner shroud 126, and the multiple passages 92, any head loss, or flow resistance, in that region of Fukuno is generated in the small clearance, which then forces the air to flow through the passages 92 to exit the vane. These arguments are not persuasive, because passages 92 generate a head loss in the leakage zone near element 73 so as to reduce a flow rate of cooling air passing through the zone, because cooling air is bled out of the vane 17 via passages 92, reducing the amount of cooling air available for vane cooling, and thus generating a head loss in the leakage zone, and reducing a

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flow rate of cooling air passing through the leakage zone. With regard to Applicants' argument that Fukuno is silent concerning the other end of the cylindrical member being free to slide along an inside edge of the vane due to relative thermal expansion between the liner and the vane, and that the Office action fails to document this, the examiner respectfully disagrees. The previous Office action clearly states that the liner 47 is free at an inner end to slide along an inside edge of the vane under the effects of relative thermal expansion between the liner and the inside wall of the vane. Figure 3 of Fukuno clearly shows that the liner 47 has no attachment at its inner end to the vane, and one of ordinary skill in the art would readily recognize from figure 3 that the liner is free at its inner end to slide along an inside edge of the vane under the effects of relative thermal expansion between the liner and the inside wall of the vane.

With regard to Applicants' argument that in North, the axially extending passages 92 and 92' are not disposed in the leakage zone between the free end of the liner and the inside edge of the vane, but emerge in the exhaust cavity, Applicants have correctly characterized North, however this argument is not persuasive, because North is not relied upon to teach this feature, but is relied upon to teach a turbomachine turbine vane 17 having a liner 47 that is secured/attached to the vane at an outer end 27 of a shroud (see column 3, lines 50-52), for the purpose of retaining the liner to the vane, preventing the liner from falling out of the vane.

With regard to Applicants' argument that there is no motivation to combine Fukuno, North, and Soechting 6,761,529 to arrive at the claimed subject matter of claim 3, because the flow paths 92 of Soechting are not disposed circularly, but on a line as illustrated in figures 2 and

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6, the examiner disagrees. As set forth in the previous Office action, the modified turbine vane of Fukuno shows all of the claimed subject matter, including a recess 92, but does not explicitly disclose that the recess is circularly symmetrical, and Soechting is relied upon to show a cooled turbine vane 25 having cooling holes 92, in the form of recesses that are circularly symmetrical, for the purpose of providing for exhaust of used cooling air from the vane without turbulence. Clearly, the interior shape of cooling passages 92 of Soechting is circularly symmetrical. With regard to Applicants' arguments that it is well known in fluid mechanics that transition from laminar flow to turbulent flow is primarily controlled by the Reynolds number and that Fukuno, North, and Soechting are silent as to specific dimensional or flow characteristics and properties in the disclosed passages for one to reach the conclusion that the flow passages of Soechting discharge air without turbulence, that such a claim is an unsubstantiated conclusory reason to combine the references, and that there is no evidence within the record to support the conclusion that the flow conditions in Soechting are any different than they are in Fukuno or North, the examiner disagrees. One of ordinary skill in the art, viewing figure 6 of Soechting, would clearly recognize that passages 92 are circularly symmetrical, have no constriction or increase in diameter, and thus provide for exhaust of used cooling air from the vane without turbulence.

### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the elliptical groove (new claim 19) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

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Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Specification*

The disclosure is objected to because of the following informalities: Appropriate correction is required.

On page 1, line 1, "TITLE OF THE INVENTION" should be changed to -- A turbine vane cooled by a reduced cooling air leak --.

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The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Claim 11, which recites that the circular groove is disposed along an azimuthal direction of the end of the liner, has no antecedent basis in the specification (but is inherently shown in the drawings).

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 15-17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. New claim 15 recites the corrugated cross section having “at least” three indentations. The original specification is limited to three indentations, and reciting “at least” three indentations adds new matter. New claim 16, lines 2-3, which recite that a depth of each indentation is approximately 0.6 mm and a radius of curvature of each indentation is approximately 0.2 mm, adds new matter, because the original specification is limited to the depth of each indentation being exactly 0.6 mm and a radius of curvature of each indentation being

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exactly 0.2 mm. New claim 17, lines 1-2, which recites that a total width of the groove is approximately 2 mm, adds new matter, because the original specification is limited to a total width of the groove being exactly 2 mm.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-2 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuno 6,089,822 in view of North 5,609,466. Fukuno (figures 1-3) discloses a turbomachine turbine vane 17 substantially as claimed, including a multiply-perforated liner 47 (having perforations 71) defining an unnumbered annular cavity between an outside wall of the liner and an inside



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wall of the vane, an air admission opening 44 for feeding the inside of the liner with cooling air and an air exhaust opening (unnumbered, near 73) for exhausting a fraction of the cooling air from the vane, the liner being free at an inner end to slide along an inside edge of the vane under the effects of relative thermal expansion between the liner and the inside wall of the vane, the annular gap between the free end of the liner and the inside edge of the vane defining a leakage zone (near 73) for cooling air, wherein the inside edge includes a recess 92 for generating head loss in the leakage zone so as to reduce the flow rate of cooling air passing therethrough. The recess is made over part of the periphery of the inside edge. A turbomachine turbine 3 includes plural cooled vanes 17.

However, Fukuno does not explicitly disclose that the liner 47 is secured to the vane at one end, rather unnumbered flanges of the liner appear to be resting on outer shroud 27.

North (figure 3) shows a turbomachine turbine vane 17 having a liner 47 that is secured/attached to the vane at an outer end 27 of a shroud (see column 3, lines 50-52), for the purpose of retaining the liner to the vane, preventing the liner from falling out of the vane.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine vane of Fukuno such that the liner 47 is secured to the vane at one end, as taught by North, for the purpose of retaining the liner to the vane, preventing the liner from falling out of the vane.

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Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuno 6,089,822 and North 5,609,466 as applied to claim 2 above, and further in view of Soechting 6,761,529. The modified turbine vane of Fukuno shows all of the claimed subject matter, including a recess 92, but does not explicitly disclose that the recess is circularly symmetrical.

Soechting (figures 5-8) shows a cooled turbine vane 25 having cooling holes 92, in the form of recesses that are circularly symmetrical, for the purpose of providing for exhaust of used cooling air from the vane without turbulence.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified turbine vane of Fukuno such that the recess 92 is circularly symmetrical, as taught by Soechting, for the purpose of providing for exhaust of used cooling air from the vane without turbulence.

***Allowable Subject Matter***

Claims 8-14 and 18-20 are allowed.

Claims 4-6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

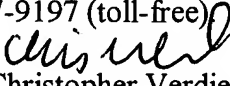
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (571) 272-4824. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C.V.  
July 15, 2005

  
Christopher Verdier  
Primary Examiner  
Art Unit 3745